

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
7 February 2002 (07.02.2002)

(10) International Publication Number
WO 02/11123 A3

PCT

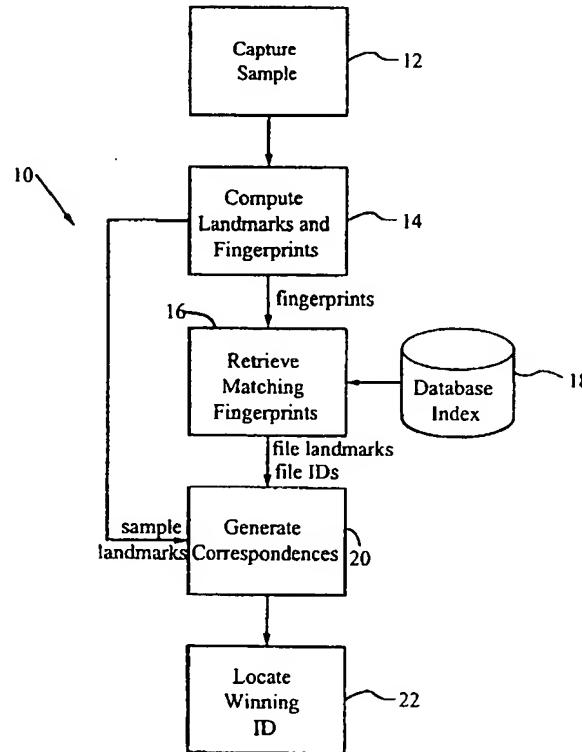
(51) International Patent Classification⁷: G06F 17/30. (72) Inventors; and
G10H 1/00, G10L 15/02, 15/20 (75) Inventors/Applicants (for US only): WANG, Avery,
(21) International Application Number: PCT/EP01/08709 Li-Chun [US/US]; 2915 Ross Road, Palo Alto, CA 94303
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(22) International Filing Date: 26 July 2001 (26.07.2001) Avenue, Palo Alto, CA 94308 (US).
(25) Filing Language: English (74) Agent: BOYCE, Conor; F. R. Kelly & Co., 27 Clyde
(26) Publication Language: English Road, Ballsbridge, Dublin 4 (IE).
(30) Priority Data:
60/222,023 31 July 2000 (31.07.2000) US (81) Designated States (national): AE, AG, AL, AM, AT, AU,
09/839,476 20 April 2001 (20.04.2001) US AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,
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SHAZAM ENTERTAINMENT LIMITED [GB/GB]; 189 Wardour Street, Suite 22, London W1F 8ZD (GB). (84) Designated States (regional): ARIPO patent (GH, GM,
189 Wardour Street, Suite 22, London W1F 8ZD (GB). KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian

[Continued on next page]

(54) Title: METHOD FOR SEARCH IN AN AUDIO DATABASE



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(57) **Abstract:** A method for recognizing an audio sample locates an audio file that most closely matches the audio sample from a database indexing a large set of original recordings. Each indexed audio file is represented in the database index by a set of landmark timepoints and associated fingerprints. Landmarks occur at reproducible locations within the file, while fingerprints represent features of the signal at or near the landmark timepoints. To perform recognition, landmarks and fingerprints are computed for the unknown sample and used to retrieve matching fingerprints from the database. For each file containing matching fingerprints, the landmarks are compared with landmarks of the sample at which the same fingerprints were computed. If a large number of corresponding landmarks are linearly related, i.e., if equivalent fingerprints of the sample and retrieved file have the same time evolution, then the file is identified with the sample. The method can be used for any type of sound or music, and is particularly effective for audio signals subject to linear and nonlinear distortion such as background noise, compression artifacts, or transmission dropouts. The sample can be identified in a time proportional to the logarithm of the number of entries in the database; given sufficient computational power, recognition can be performed in nearly real time as the sound is being sampled.



patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CE, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(iii)) for the following designations AE, AG, AL, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE,

DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CE, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations of inventorship (Rule 4.17(iv)) for US only

Published:

*with international search report
before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(88) Date of publication of the international search report:

30 May 2002

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

Int. Application No.
PCT/EP 01/08709

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 G06F17/30 G10H1/00 G10L15/02 G10L15/20							
According to International Patent Classification (IPC) or to both national classification and IPC							
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC 7 G06F G10H G10L							
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched							
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal, WPI Data, INSPEC							
C. DOCUMENTS CONSIDERED TO BE RELEVANT <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; padding: 2px;">Category</th> <th style="text-align: left; padding: 2px;">Citation of document, with indication, where appropriate, of the relevant passages</th> <th style="text-align: left; padding: 2px;">Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 2px;">X</td> <td style="padding: 2px;"> US 4 852 181 A (MORITO ET AL) 25 July 1989 (1989-07-25) abstract; figures 4,6,7,9,11 column 2, line 30-54 --- -/-/ </td> <td style="text-align: center; padding: 2px;"> 1-3,5, 8-10,12, 19,20, 34-36, 38-41, 48-51, 76,77 </td> </tr> </tbody> </table>		Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X	US 4 852 181 A (MORITO ET AL) 25 July 1989 (1989-07-25) abstract; figures 4,6,7,9,11 column 2, line 30-54 --- -/-/	1-3,5, 8-10,12, 19,20, 34-36, 38-41, 48-51, 76,77
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X	US 4 852 181 A (MORITO ET AL) 25 July 1989 (1989-07-25) abstract; figures 4,6,7,9,11 column 2, line 30-54 --- -/-/	1-3,5, 8-10,12, 19,20, 34-36, 38-41, 48-51, 76,77					
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.							
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Date of the actual completion of the international search							
12 March 2002							
Date of mailing of the international search report							
19/03/2002							
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl. Fax: (+31-70) 340-3016							
Authorized officer Quélavoine, R.							

Form PCT/ISA/210 (second sheet) (July 1992)

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Int'l Application No
PCT/EP 01/08709

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	LIU S A: "LANDMARK DETECTION FOR DISTINCTIVE FEATURE-BASED SPEECH RECOGNITION" JOURNAL OF THE ACOUSTICAL SOCIETY OF AMERICA, AMERICAN INSTITUTE OF PHYSICS. NEW YORK, US, vol. 100, no. 5, 1 November 1996 (1996-11-01), pages 3417-3430, XP000641690 ISSN: 0001-4966 abstract ---	4,11, 42-47, 52-55, 68-71
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Information on patent family members

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